WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electrical Code (ANSI CI) and/or any other requirements which may be applicable to the user.

Installation, operation, and maintenance should be performed only by qualified personnel.

TM-110390AU-1

VOLUME I

OPERATORS'S MANUAL

626-PA-6006 AC NEUTRAL MONITOR

NOTE

Refer to Volume 2 (Service Manual) of TM-110390AU for maintenance data.

1 May 1984
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(Rev. 15 May 1987)
(Rev. 1 Sept. 1989)
(Rev. B)

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Manual Effectivity

Instruction Manual TM-110390AU provides operating instructions for 626-PA-6006 plug-ins having differential signal inputs. These units have three circuit voltage input connectors or terminal blocks on the rear panel. Units received after October, 1982 will probably be of the differential input type.

If a 626-PA-6006 has a two-circuit voltage input connector or terminal block, TM-110390 applies.

NOTE

The information in this manual has been reviewed and is believed to be entirely reliable. However, no responsibility is assumed for any inaccuracies. The material in this manual is for information purposes only, and is subject to change without notice.

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IMPORTANT! CALIBRATION INTERVAL

The recommended calibration interval for this unit is once every 12 MONTHS.

We recommend that you return the unit to the factory for calibration. If you decide to do so, first contact the Dranetz Customer Service Department to obtain an authorization number.

Telephone Number:	(201) 287-3680
Telex Number:	499-7808
TWX Number:	(710) 997-9553
FAX Number:	(201) 248-9240
Cable:	DRANETZ

Then fill out the Repair/Service Order form enclosed in this manual and ship it along with the unit to the Dranetz Customer Service Department. (If this form is missing, ask the Dranetz Customer Service Department for a replacement.)

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VOLUME 1
OPERATOR'S MANUAL

626-PA-6006 AC NEUTRAL MONITOR

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, consists of three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. In additon, Appendices A and B cover Options 101 and 102, respectively, for the 6006 plug-in. Volume 2, the Service manual, contains the maintenance instructions (Sections IV thru VII).

1.2 INTRODUCTION

This technical manual provides installation and operating instructions for the 626-PA-6006 AC Neutral Monitor Plug-in, hereinafter referred to as the 6006. The 6006 is designed for installation in the Series 626 Universal Disturbance Analyzer. It is assumed that the reader is familiar with the mainframe information presented in Volume 1 of the Series 626 Mainframe manual.

1.3 PURPOSE

The 6006 monitors activity on power system neutral lines with respect to earth ground. With thresholds programmed by the user, the 6006 stores, analyzes, classifies and prints out quantitive and qualitative disturbance data. Accompanying the data is a printout of time, derived from a highly accurate crystal controlled 24-hour clock in the mainframe. This single channel unit finds application in all distribution systems having a designated neutral conductor and operating below 600V rms.

The 6006 has a single voltage range that extends from 2V rms to 50V rms. It monitors two types of disturbances: power frequency transients and waveform disturbances. Power frequency transients are divided into three display categories: overvoltage, voltage change, and voltage surge. Since voltage on the neutral line is nominally zero with respect to earth ground, lower voltage limits are not used and voltage sag and undervoltage printouts are not generated. Waveform disturbances, identified as "impulses", are sharp deviations of short duration (compared to line frequency) from the normal waveform. The 6006 measures both peak amplitude of impulses and their polarity. When equipped with an option board the 6006 also measures pulse duration and direction of origin or pulse strength and direction of origin.

The threshold value of each type of disturbance, above which detection and printout occur, is operator programmable. Except for an automatic summary printout at the end of each day, disturbance data is normally printed out only when disturbances occur. In an alternate mode, a

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disturbance data summary printout occurs only at the end of each day. This feature permits long term unattended operation.

The threshold program may be easily altered, using the front panel switches. Cueing indicators adjacent to the programming switches simplify the programming procedure. A back-up program for the plug-in, stored in non-volatile memory at the factory, may always be recalled upon operator demand. Both the program and the disturbance data in the data accumulators may be printed out upon demand.

1.4 EQUIPMENT CHARACTERISTICS

The 6006 is configured as a plug-in module 6.5" high by 1.25" wide by 10" deep. It is designed for installation in any of the five slots of the Series 626 Universal Disturbance Analyzer. Technical specifications of the 6006 are listed in Table 1-1.

Table 1-1. 626-PA-6006 Technical Specifications

Input	2-wire differential Z = 40 Megohms plus 10 pf (each side to ground)
Voltage Range	2-50V rms, 45-65 Hz
User-set Upper Limit Voltage	3-30V rms
Voltage Change Sensitivity (1V increments)	1-9 Volts
Line Voltage Measurement Accuracy	+/-1% of reading, +/-0.2% of F.S. at calibration frequency of 50 or 60 Hz. Additional +/-1% at frequency extremes
Impulse Ranges (Determined by Impulse Threshold Selection)	25-1000V for 25 to 100V thresholds 101-2000V for 101 to 200V thresholds 201-4000V for 201 to 4000V thresholds
Impulse Duration Range	2 mSec to 1 uSec for amplitude information only.
Impulse Threshold	25-4000V in 1 volt increments.
Impulse Amplitude Accuracy	+/-5% of reading +/-1% F.S. for half-sinewave impulses 10 uSec in duration regardless of polarity. Error increases to +/-10% of reading, +/-1/% F.S. at 5 uSec and 50 uSec pulse durations, and is typically -6dB at 2 mSec and 1 uSec pulse durations.

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1.5 STANDARD ACCESSORIES

Model No.	Part No.	Quantity	Description
626-PA-6006-1	TM-110390AU Vol. I	1	Operator's Manual
626-PA-6006-2	TM-110390AU Vol. I	1	Operator's Manual
626-PA-6006-2	110487-G1	1	Input Cable with Tinned Leads

1.6 OPTIONAL ACCESSORIES

Part No.	Quantity	Description
TM-110390AU Vol. 2	1	Service (Maintenance) Manual

1.7 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact the Dranetz Customer Service Department in order to obtain an Authorization Number for factory repair.

Telephone: (201) 287-3680

TWX: (710) 997-9553

Telex: 499-7808

FAX: (201) 248-9240

Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER enclosed in the Series 626 Operating Manual. Ship it along with the malfunctioning equipment to the Dranetz Customer Service Department.

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SECTION 2
INSTALLATION AND OPERATION

2.1 INSTALLATION

To install the 6006 in the mainframe, proceed as follows:

CAUTION: Be sure 626 is turned off and that all power connected to all the plug-in modules is turned off.

a. Position the top and bottom front corners of the plug-in module in the upper and lower tracks at the desired slot position at the rear of the mainframe.

b. Carefully slide the module into the mainframe until it is firmly seated.

c. Tighten the top and bottom captive screws to secure the module to the mainframe.

2.1.1 Load Ratings

The Series 626 standard mainframe has an upper limit of the combined total rating of the installed modules. The overall mainframe capacity is set at 20 units, and individual modules have load ratings as follows:

Plug-in	Load Rating	Plug-in	Load Rating
626-PA-6001	2 Units	626-PA-60012A	3 Units
626-PA-6001 with Extra Option Board	3 Units	626-PA-6013	2 Units
626-PA-6002	2 Units	626-PA-6014	1 Unit
626-PA-6003	4 Units	626-PA-6015	4 Units
626-PA-6005	2 Units	626-PA-6018	4 Units
626-PA-6006	2 Units	626-PA-6020	4 Units
626-PA-6007	1 Unit	626-PA-6024A	4 Units
626-PA-6008	2 Units	626-PA-6024B	4 Units
626-PA-6009	4 Units	626-PA-6025	4 Units
626-PA-6011	1 Unit	626-PA-6030	6 Units
626-PA-6012	2 Units	626-PA-6037	1 Unit
		626-PA-6038	1 Unit
		626-PA-6040	6 Units

NOTE

When selecting modules for installation into any any 626 Mainframe, verify that the load rating sum of the installed modules DOES NOT exceed 20 Units.

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2.2 CONNECTING POWER SOURCE TO MODULE

2.2.1 Connection Procedure

The 6006 is supplied with a barrier type terminal strip under a small cover (626-PA-6006-1) or with a three pin connector (626-PA-6006-2) located at the rear of the module. Proceed as follows:

a. Insert key in FUNCTION key switch on front panel of mainframe and set switch to OFF position.

b. Turn off AC power to the line that is to be monitored.

c. Remove the terminal strip safety cover to expose the connections. Connect the neutral line to the terminal designated "+". Connect the earth ground point used for measurement reference to the terminal designated "-". Connect safety earth ground to terminal marked ⏚. When all connections have been made, be sure to replace the terminal block cover, then reapply AC power.

d. If a voltage input connector is installed on the rear panel of the 6006, the AC source to be monitored should be wired to the cable assembly (DEL #110487-G1) supplied with the module. If the supplied cable is not adequate, the mating connector can be obtained from AMP, INC. The part numbers are as follows:

Part Number	Description
1-480700-0	Connector Housing
1-640720-0	Strain Relief
350690-1	Pin Contacts

Attach wired mating connector to the rear panel connector then reapply AC power.

CAUTION

To avoid damaging the equipment, do not apply AC voltage in excess of 600V rms to the 6006.

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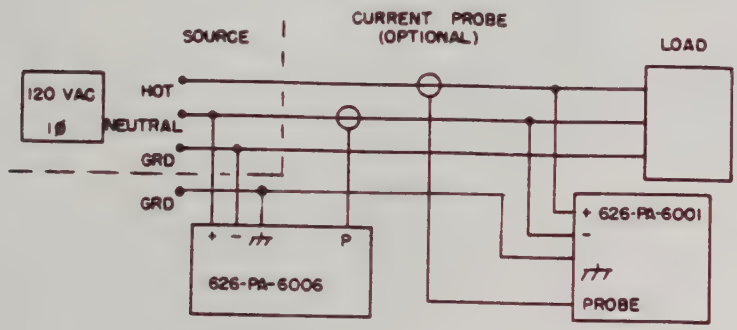
2.2.2 Circuit Applications

The 626-PA-6006 is used to monitor Neutral-Ground AC in single or multi-phase systems, usually in combination with the 626-PA-6001 or 626-PA-6003, as illustrated below.



Single Phase AC, with 626-PA-6001

Note

Current probes are included with Option 101 and 102 for 626-PA-6001 Series and 626-PA-6006 Series.

WARNING

Connection should only be performed by qualified personnel. Conductors connecting to measurement points should be approved for the specific use. When connected to branch circuits of 20 amperes or less, minimum flexible cord size is No. 18 (1 mm^2). For branch circuits with higher ampacity, refer to National Electric Code (ANSI CI-1975 Para. 240-4 and Para. 250-95). Special consideration of ground may be required. Refer to Article 250 of above reference if in doubt. Outside U.S.A. consult applicable safety standards.

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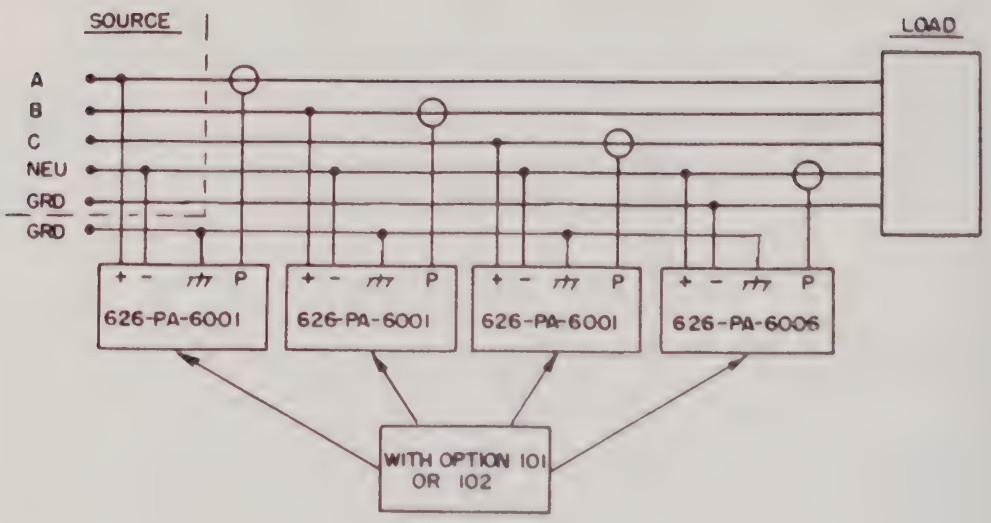
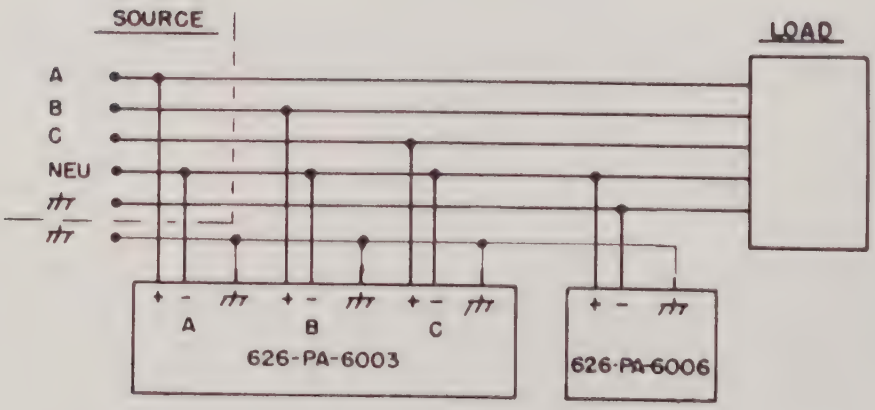


3 Phase Wye, With 626-PA-6001



3 Phase Wye, With 626-PA-6003

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2.2.3 Installation Guidelines

Proper monitoring and analysis of AC and DC voltage disturbances requires careful attention to the method of connection between the Series 626 Universal Disturbance Analyzer and the monitored circuit. To obtain the most accurate and relevant voltage monitoring data, the following suggested guidelines should be utilized.

1. To minimize spurious Impulse transients and interchannel coupling, always use the Dranetz test cables supplied with the 626. If cables are not supplied, such as with the barrier strip input modules, the test cable should be composed of twisted-pair wires for each input channel.

2. Test cable length should be minimized, preferably less than 8 feet from the Series 626 to the circuit connection point. This will minimize amplitude variation of Impulse transients.

3. If monitoring a power line connected to critical, sensitive load equipment, the test cable should be connected to the power line as close as possible to the load. For three-phase loads, the 626 should be connected in the same way as the load equipment, i.e. Phase to Phase or Phase to Neutral.

4. Use of instrument-grade Potential Transformers for monitoring Impulses on high voltage power lines is not recommended. The limited frequency response of most Potential Transformers may result in substantial variation of Impulse amplitude.

5. The Series 626 is designed to operate from disturbed power lines. Therefore, the 626 power supply may be connected to the same power line that is being monitored. However, the user should be aware that the extensive transient suppression incorporated with the 626 power supply may alter the transient characteristics of the AC power line to which the power supply is connected. If the user wishes to prevent alteration of the transient characteristics of the power line being monitored, the 626 power supply input should be separated from the monitored inputs.

6. The ground terminals of the plug-in modules are connected internally to the safety grounding conductor in the 626 power plug. Be careful not to inadvertently contaminate a "clean" ground with a "dirty" ground.

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2.3 OPERATING THE 6006

2.3.1 Operating Controls and Indicators

The functions of the mainframe operating controls and indicators associated with 6006 operation are described in Table 2-1. Figure 2-1 shows the typical front panel controls associated with a 6006. For a description of controls common to overall Series 626 operation, refer to Volume 1 of the Series 626 Mainframe manual.

2.3.2 Programming Procedure

Assume it is desired to program a high limit of 20V, a voltage sensitivity of 2 volts, and an impulse sensitivity of 75V. Sensitivity sets the deviation from the present value above or below which a detected value produces a recorded disturbance.

Impulse ranges are set up automatically in accordance with pulse sensitivity selected. Thus, selection of an impulse sensitivity of 75V automatically produces an impulse range of 25 to 1000V (See Table 1-1).

Table 2-1. 6006 Operating Controls

Item	Function
HI LIMIT pushbutton	When depressed, enables numeric keyboard to program high limit voltage.
SENS pushbutton	When depressed, enables numeric keyboard to program voltage sensitivity value.
IMP SENS pushbutton	When depressed, enables numeric keyboard to program impulse voltage sensitivity value.
ENTER pushbutton	When depressed, transfers numeric keyboard value into the 6006 memory.
DATA pushbutton	When depressed, produces data summary printout. (Functions in operate mode only.)
PROG pushbutton	When depressed, unit prints time and a summary of the program (threshold settings) in each channel in sequence (1-5). (Functions in operate mode only.)
PRESET pushbutton	With FUNCTION switch set to PROGRAM and a channel switch (1-5) depressed, depressing PRESET switch recalls non-volatile factory program for that channel.

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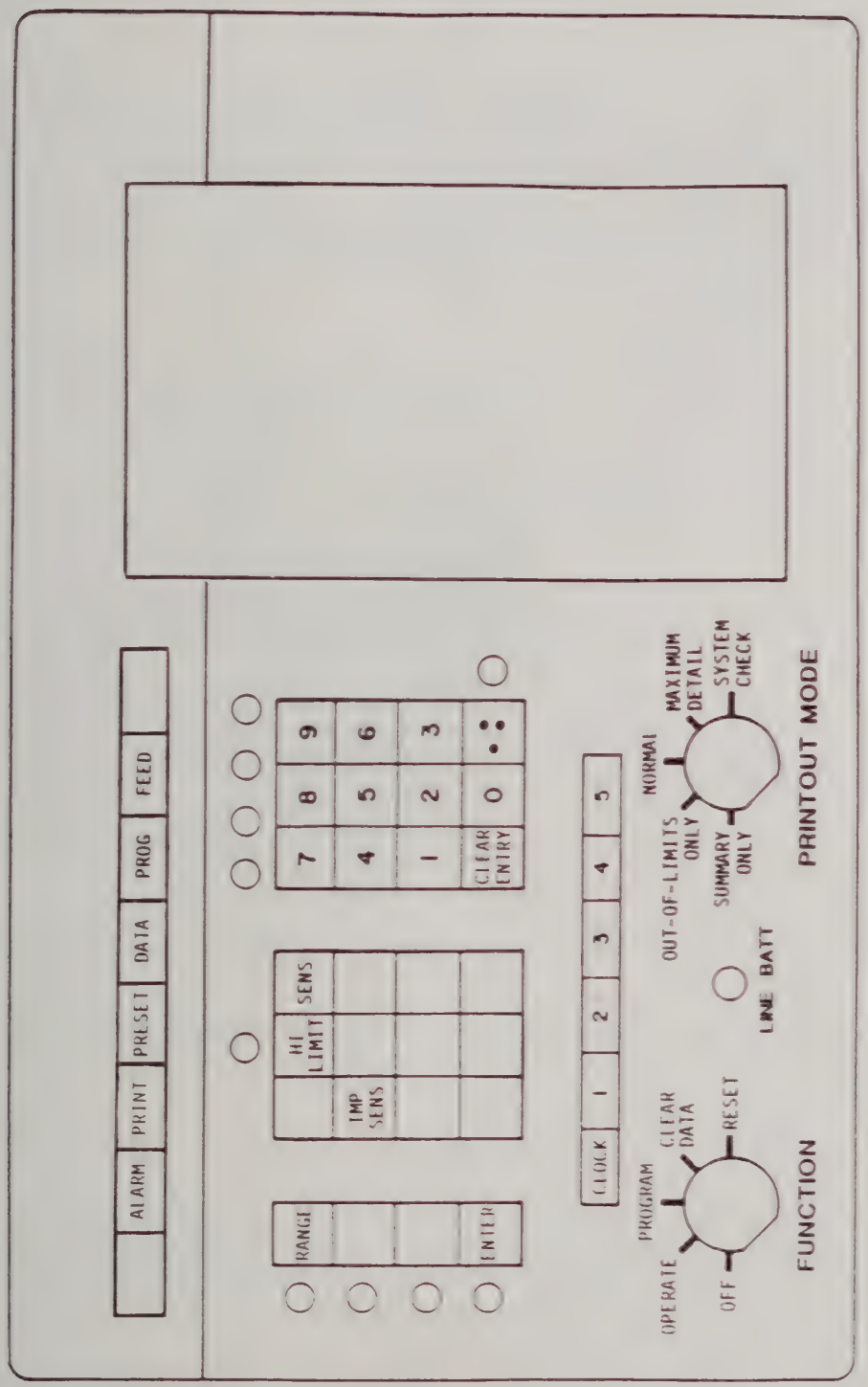

Figure 2-1. Series 626 Controls Used by the 6006 Plug-In

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For impulse measurements, the sensitivity corresponds to the absolute threshold, so that for an impulse sensitivity of 75 volts, a disturbance is recorded when impulse amplitude is greater than or equal to 75 volts.

For the example cited, program the 6006 as follows:

a. Set FUNCTION switch to PROGRAM.

b. Depress the channel pushbutton (1-5) that corresponds to the slot position of the plug-in to be programmed. Note that a program summary for that channel is immediately printed.

c. Note that the red cueing lamp above the center bank of pushbuttons lights. This indicates that one of the functions in that pushbutton bank is to be selected. Depress the HI LIMIT pushbutton.

d. Note that two yellow lamps above the numeric keyboard now light. Enter 20 using the keyboard. As each digit is entered, one lamp goes out. If an error is made, depress CLEAR ENTRY and correct the entry.

e. When the high limit value has been programmed, the green lamp next to the ENTER pushbutton lights. Depress this pushbutton to enter the value. The high limit entry (V HIGH LIMIT 20V) will now be echoed back on the printout.

f. When the green ENTER indicator goes out, the red indicator above the center bank of pushbuttons lights again. This indicates that another function may be programmed.

g. Depress the SENS pushbutton. Program the voltage sensitivity value (2) as in step d.

h. When the green ENTER indicator lights, depress the ENTER pushbutton. The programmed voltage sensitivity value will be echoed back on the printout.

i. Repeat steps f, g, and h for the impulse sensitivity (0075), using the IMP SENS pushbutton.

j. When the plug-in program is completed, the user may proceed to program another module (by depressing another channel number) or he may place the instrument on line by setting the FUNCTION switch to OPERATE. While on line, the program in effect may be obtained by simply depressing the PROG pushbutton.

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2.4 SELECTING THE FACTORY PRESET PROGRAM

To select the program stored in hard memory, set the FUNCTION switch to PROGRAM and depress the channel number desired. The last operator-set program will be printed out. Now depress the PRESET push- button to recall the factory-set program. Unless specially modified to customer requirements, the factory-set program for the 6006 is as follows:

626	626A,G,R,ARA
IMPULSE SENS 0100V	PROGRAM SUMMARY
VOLTAGE SENS 002V	CH 1
V HIGH LIMIT 05V	626-PA-6006
626-PA-6006	V HIGH LIMIT 05V
CH 1	VOLTAGE SENS 002V
PROGRAM SUMMARY	IMPULSE SENS 0100V

2.5 DESCRIPTION OF DATA PRINTOUTS

When any of the disturbances described below is detected by the 6006, it is recorded and displayed as illustrated in the following paragraphs.

2.5.1 Overvoltage

An overvoltage condition exists when the monitored power line neutral voltage exceeds the user specified upper limit for more than 2.55 seconds. An overvoltage condition is indicated by a printout such as the following:

```
4 HIGH 12:34:56.78
```

where 4 is the channel number and time is given in hours, minutes and seconds (to .01 sec resolution).

When the line voltage recovers to normal, a printout such as the following occurs:

626	626A,G,R,ARA
4 NORM 12:36:14.56	35.8 V MAX
35.8 V MAX	4 NORM 12:36:14.56

indicating when normal voltage was restored and the value of the highest voltage reached during the overvoltage interval.

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2.5.2 Voltage Change

A voltage change printout is triggered when the neutral to ground voltage changes more than a preselected amount from the last printed value. The voltage change sensitivity is a user selected integral voltage between 1 and 9 volts. The following example shows several voltage change printouts. The first shows a voltage increase to 15.4V at the time shown; the second shows a decrease to 9.2V.

	626	626A,G,R,ARA	
↑	2 INC 01:02:34.58 15.4V	15.4V 2 INC 01:02:34.58	↓
	2 DEC 01.01:34.56 9.2V	9.2V 2 DEC 01:01:34.56	

2.5.3 Voltage Surge

A Voltage Surge is defined as line voltage which increases through a user-selected upper limit and then returns to an in-tolerance condition in less than 2.56 seconds. When a surge begins, its starting time is printed as follows:

```
3 HIGH  12:34:50.49
```

When the line voltage returns to a normal level following a Surge condition, a message such as the following will be printed:

	626	626A,G,R,ARA	
↑	3 NORM 12:34:51.59 35.2 V MAX SURGE 1.10 SEC	SURGE 1.10 SEC 35.2 V MAX 3 NORM 12:34:51.59	↓

In this case, the time at which the voltage returned to normal is shown as well as the maximum voltage reached and the surge duration.

2.5.4 Impulses

"Impulse" disturbances represent any line perturbation which contains frequency components in the 300Hz to 500KHz range. An impulse type disturbance produces a printout such as the following:

	626	626A,G,R,ARA	
↑	2 IMP 10:12:13.45 +0139 V PK	+0139 V PK 2 IMP 10:12:13.45	↑

This printout indicates that an impulse which deviated from normal neutral line voltage by +139 volts peak was detected on channel 2 at the time shown. The "+" indicates the impulse was positive with respect to the signal return (-) terminal on the rear panel of the 6006.

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2.6 PRINTOUT MODES

The setting of the PRINTOUT MODE switch on the front panel of the mainframe determines how much detail is printed out. Printout data is reduced as the switch is rotated counterclockwise.

The following example printouts show how various settings of the PRINTOUT MODE switch change the amount of detail in the printed record of a disturbance. It is assumed that the disturbances occurred in Channel 1 and that the limits for Channel 1 were programmed as follows:

V HIGH LIMIT	120Vrms
V SENSITIVITY	2Vrms

The example printouts are referenced to figure 2-2 which illustrates an overvoltage disturbance.

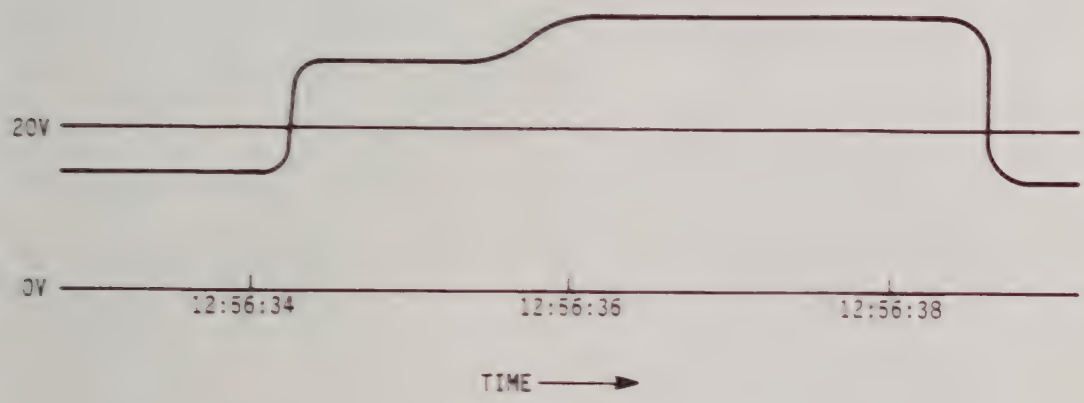

Figure 2-2. Overvoltage Disturbance (6000)

Disturbances which occur while the PRINTOUT MODE switch is in the SUMMARY ONLY position do not generate individual printouts but they are stored in the daily accumulator and are automatically printed each day at midnight (worst case event and number of occurrences in each category). This printout may also be triggered manually by depressing the DATA button.

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The first printout group generated below illustrates overvoltage (fig. 2-2) in the NORMAL mode. The second group shows overvoltage in the OUT-OF-LIMITS mode.

626

```
1 NORM 12:56:38.51
  34.1 V MAX

1 HIGH 12:56:34.21


1 NORM 12:56:38.51
  34.1 V MAX

1 DEC 12:56:38.50
  25.2 V

1 INC 12:56:35.78
  32.3 V

1 INC 12:56:35.62
  30.3 V

1 INC 12:56:35.40
  28.3 V

1 INC 12:56:34.22
  26.3 V

1 INC 12:56:34.21
  24.2 V

1 HIGH 12:56:34.21
```

626A,G,R,ARA

```
1 HIGH 12:56:34.21

  24.2 V
1 INC 12:56:34.21

  26.3 V
1 INC 12:56:34.22

  28.3 V
1 INC 12:56:35.40

  30.3 V
1 INC 12:56:35.62

  32.3 V
1 INC 12:56:35.78

  25.2 V
1 DEC 12:56:38.50

  34.1 V MAX
1 NORM 12:56:38.51


1 HIGH 12:56:34.21

  34.1 V MAX
1 NORM 12:56:38.51
```


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The following printout illustrates overvoltage (fig. 2-2) in the MAXIMUM DETAIL mode.

626	626A,G,R,ARA
1 DEC 12:56:38.61 14.8 V	
1 DEC 12:56:38.53 16.8 V	
1 DEC 12:56:38.51 19.0 V	
1 NORM 12:56:38.51 34.1 V MAX	
1 DEC 12:56:38.50 25.2 V	
1 INC 12:56:35.78 32.3 V	
1 INC 12:56:35.62 30.3 V	
1 INC 12:56:35.40 28.3 V	
1 INC 12:56:34.22 26.3 V	
1 INC 12:56:34.21 24.2 V	
1 HIGH 12:56:34.21	
1 INC 12:56:34.20 16.1 V	
	16.1 V 1 INC 12:56:34.20
	1 HIGH 12:56:34.21
	24.2 V 1 INC 12:56:34.21
	26.3 V 1 INC 12:56:34.22
	28.3 V 1 INC 12:56:35.40
	30.3 V 1 INC 12:56:35.62
	32.3 V 1 INC 12:56:35.78
	25.2 V 1 DEC 12:56:38.50
	34.1 V MAX 1 NORM 12:56:38.51
	19.0 V 1 DEC 12:56:38.51
	16.8 V 1 DEC 12:56:38.53
	14.8 V 1 DEC 12:56: 38.61

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SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section provides information for performing an operational test to verify that the 6006 plug-in is operating properly.

3.2 SYSTEM CHECK

When the Printout Mode Switch is set to SYSTEM CHECK, a source of precise signals is applied to the front end circuitry of the 6006. Any inputs that are connected at this time will be automatically disconnected for the system check period. These signals fully verify the functionality of the module. A typical system check printout, as well as the system signals and the allowable tolerance levels, are shown below.

3.3 SYSTEM CHECK SIGNAL LEVELS

Impulse: +160V pk
Voltage: 30.0 Vrms

3.4 SYSTEM CHECK SIGNAL TOLERANCES

Impulse: +134 to +186V pk
Voltage: 29.6 to 30.4V rms

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APPENDIX A. IMPULSE DURATION/DIRECTION OPTION, OPTION 101 FOR 626-PA-6006 PLUG-IN (NOT COMPATIBLE WITH OPTION 102)

A.1 INTRODUCTION

The following paragraphs describe the differences between the 6006 with Option 101 and the standard 6006. The information that follows supersedes that found in previous paragraphs of this manual unless otherwise stated.

A.2 PURPOSE

Option 101 has no effect on the neutral to ground voltage measurements of the 6006 described in paragraph 1.3. It also does not affect the measurement of impulse polarity and peak voltage. Option 101 is designed to provide information on impulse duration. In addition, if the TR-2018 current probe is used, direction of origin will be determined for impulses having a current of 3 Amps or greater at the time of measurement.

A.3 EQUIPMENT CHARACTERISTICS

Technical specifications for Option 101 are listed in Table A-1. All specifications for the 6006 listed in Table 1-1 still apply.

Table A-1. 626-PA-6006 Option 101 Technical Specifications

IMPULSE DURATION

Range: 1 uSec to 1023 uSec

Accuracy: +/-6% of reading +/-0.3% F.S. for 1/2 sinewave pulses up to 100 uSec duration greater than 100 Vpk. Typically - 10% at 200 uSec, -20% at 400 uSec, -50% at 1000 uSec.

Timing Reference Points: Start at 25V - stop at 30% of Vpk.

Minimum Impulse Voltage: 50 Vpk

IMPULSE DIRECTION OF ORIGIN

Minimum Impulse Current: 3 Amps for 0.1 uSec before and after measurement.

Minimum Impulse Voltage: 50 Vpk

Maximum Line Frequency Current: 250 A rms

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A.4 INSTALLATION IN MAINFRAME

The module is installed in the mainframe in the same manner as the standard 6006 described in paragraph 2.1.

A.5 CONNECTIONS TO THE MODULE

Connecting the 6006 to the line to be monitored is the same as described in paragraph 2.2. If impulse direction information is required, the current probe must be connected in the following manner.

a.) Turn off AC power to the line that is to be monitored.

b.) Attach the current probe connector to its mating connector on the rear panel of the 6006.

c.) Install current probe on the line which is connected to the "+" voltage terminal of the corresponding channel. Be sure that the arrow on the current probe points from the source to the load. (See figure A-1.)

d.) Reapply AC power.

A.6 OPERATING THE 6006 WITH OPTION 101

Operation of the 6006 with Option 101 requires no additional programming steps. Programming is the same as described in paragraphs 2.3 and 2.4.

A.7 DESCRIPTION OF DATA PRINTOUTS

The only printouts affected by the addition of Option 101 are those for module identification and impulse data.

When a Program Summary key (designated "PROG") is depressed, the module will be identified as a 626-PA-6006R1 as in the following example.

626

```
IMPULSE SENS Ø1ØØV
VOLTAGE SENS ØØ2V
V HIGH LIMIT 125V
  626-PA-6ØØ6R1
      CH1
11/17/83   15:2Ø:26
PROGRAM SUMMARY
```

626A,G,R,ARA

```
PROGRAM SUMMARY
11/17/83  15:2Ø:26
      CH 1
 626-PA-6ØØR1
V HIGH LIMIT 125V
VOLTAGE SENS ØØ2V
IMPULSE SENS Ø1ØØV
```


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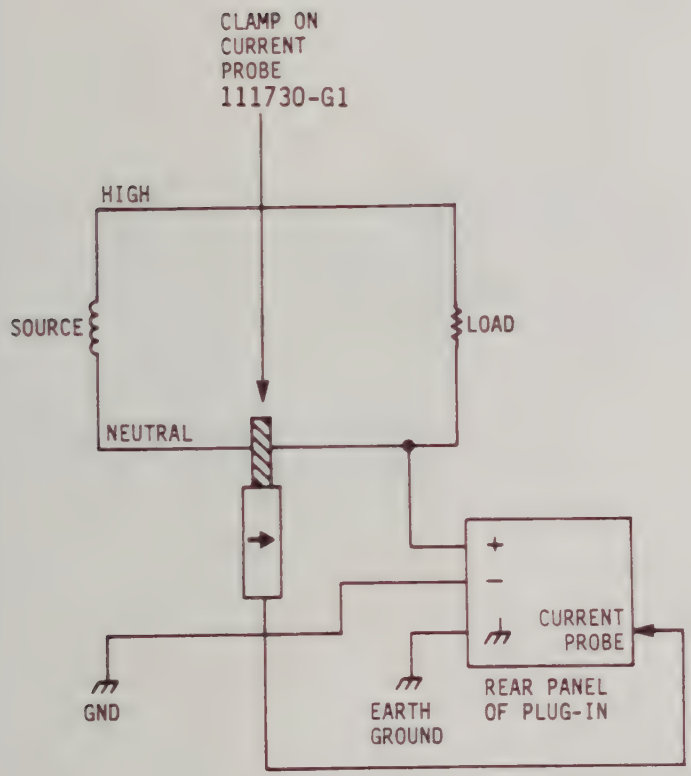

Figure A-1. Proper Connections of 626-PA-6006 for Use with Current Probe

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IMPULSE

A minimum impulse voltage of 50 Vpk is required to obtain duration data. For information on the direction of origin, a minimum impulse voltage of 50 Vpk and a minimum impulse current of 3 Amps is required.

If the current probe is not used or if it is used, but the impulse current is less than 3 Amps at the time of measurement, the printout will take on the following form:

	626	626A,G,R,ARA
↑	4 IMP 12:34:56.88 +2057V, 089uS	+2057V, 089us 4 IMP 12:34:56.88 ↓

This printout indicates that an impulse which deviated from the normal line voltage for 89 microseconds with a peak voltage of 2057 volts was detected on channel 4 at the time shown. The "+" preceding the impulse voltage indicates that the impulse was positive with respect to the ground terminal on the 6006 rear panel.

IMPULSE WITH DIRECTION

When the current probe is used and the impulse current is greater than 3 Amp at the time of measurement, the printout will take the form of the following:

	626	626A,G,R,ARA
↑	4 IMP 12:34:57.00 +2057V, LOAD, 089uS	+2057V, LOAD, 089us 4 IMP 12:34:57.00 ↓

This printout indicates that an impulse originating from the load, of +2057 volts peak and 89 microseconds in duration occurred at the time shown. If the direction had been from the source, SRCE would be printed in place of LOAD in the example. Figure A-2 illustrates an impulse duration measurement.

A.8 PRINTOUT MODES

Printout modes and calibration signals remain the same as in the standard 6006 described in paragraph 2.6.

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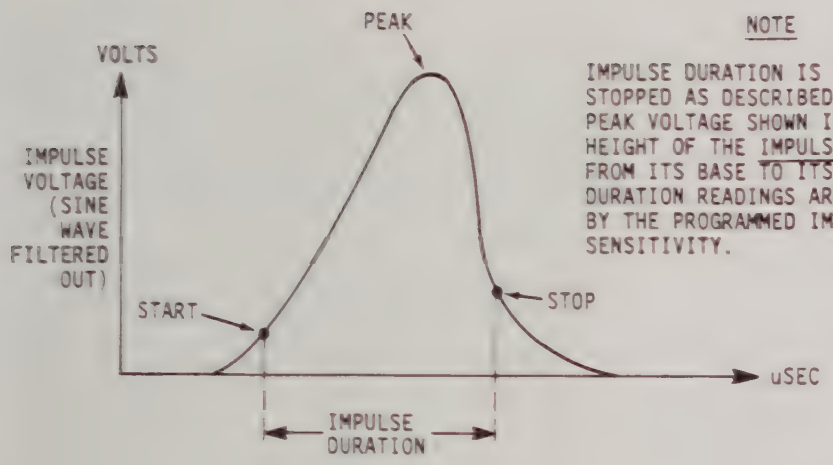
PEAK
VOLTS
IMPULSE VOLTAGE (SINE WAVE FILTERED OUT)
START
STOP
uSEC
IMPULSE DURATION
NOTE
IMPULSE DURATION IS STARTED AND STOPPED AS DESCRIBED IN TABLE A-1. PEAK VOLTAGE SHOWN IS STRICTLY THE HEIGHT OF THE IMPULSE ALONE, FROM ITS BASE TO ITS PEAK. DURATION READINGS ARE UNAFFECTED BY THE PROGRAMMED IMPULSE SENSITIVITY.

Figure A-2. Impulse Duration Measurement

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APPENDIX B. IMPULSE AREA/DIRECTION OPTION, OPTION 102 FOR 626-PA-6006 SERIES (NOT COMPATIBLE WITH OPTION 101)

B.1 INTRODUCTION

The following paragraphs describe the differences between the 6006 with Option 102 and the standard 6006.

NOTE

The following data supersedes that found in Sections 1 through 3 unless otherwise stated.

B.2 PURPOSE

Option 102 has no effect on the neutral to ground voltage measurements of the 6006 described in paragraph 1.3. It also does not affect the measurement of impulse polarity and peak voltage. Option 102 is designed to provide information on impulse area. In addition, if the current probe is used, direction of origin will be determined for impulses having a current of 3 Amps or greater at the time of measurement.

B.3 EQUIPMENT CHARACTERISTICS

Technical specifications for Option 102 are listed in Table B-1. All specifications for the 6006, listed in Table 1-1, still apply.

Table B-1. 626-PA-6006 Option 102 Technical Specifications

IMPULSE AREA

Range: 0.0002 to 0.2046 V-Sec

Accuracy: ±10% of reading, ±0.1% of F.S. for 1/2 sinewave pulses up to 100 uSec duration greater than 100 Vpk. Typically -20% at 200 uSec, -50% at 500 uSec.

Timing Reference Points: Start at 25V - stop at 30% of Vpk.

Minimum Impulse Voltage: 50 Vpk.

IMPULSE DIRECTION OF ORIGIN

Minimum Impulse Current: 3 Amps for 0.1 uSec before and after measurement.

Minimum Impulse Voltage: 50 Vpk

Maximum Line Frequency Current: 250 A rms

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B.4 INSTALLATION IN MAINFRAME

The module is installed in the mainframe in the same manner as the standard 6006 described in paragraph 2.1.

B.5 CONNECTIONS TO THE MODULE

Connecting the 6006 to the line to be monitored is the same as described in paragraph 2.2. If impulse direction information is requred, the current probe must be connected as described in paragraph A.5.

B.6 OPERATING THE 6006 WITH OPTION 102

Operation of the 6006 with Option 102 requires no additional programming steps. Programming is the same as described in paragraph 2.3.2.

B.7 DESCRIPTION OF DATA PRINTOUTS

The only printouts affected by the addition of Option 102 are those for module identification and impulse data. When the Program Summary key (designated "PROG") is depressed, the module will be identified as a 626-PA-6006R2 as in the following example.

626	626A,G,R,ARA
IMPULSE SENS 0100V	PROGRAM SUMMARY
VOLTAGE SENS 002V	11/17/83 15:30:00
V HIGH LIMIT 025V	CH1
626-PA-6006R2	626-PA-6006R2
CH1	V HIGH LIMIT 25V
11/17/83 15:30:00	VOLTAGE SENS 002V
PROGRAM SUMMARY	IMPULSE SENS

IMPULSE

A minimum impulse voltage of 50 Vpk is required to obtain area data. For information on the direction of origin, a minimum impulse voltage of 50 Vpk and a minimum impulse current of 3 Amps is required.

If the current probe is not used, or if it is used but the impulse current is less than 3 Amps at the time of measurement, the printout will take on the following form:

626	626A,G,R,ARA
4 IMP 12:34:56.88	+2057V
0.0156 V-SEC	0.0156 V-SEC
+2057V	4 IMP 12:34:56.88

This printout indicates that an impulse which deviated from the normal line voltage with an area of 0.0156V-Sec and a peak voltage of 2057 volts was detected on channel 4 at the time shown. The "+" preceding the impulse voltage indicates that the impulse was positive with respect to the ground terminal on the 6006 rear panel.

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IMPULSE WITH DIRECTION

When the current probe is used and the impulse current is greater than 3 Amps at the time of measurement, the printout will take the following form:

	626	626A,G,R,ARA	
↑	4 IMP 12:34:57.00	+2057V, LOAD	↓
	0.0156 V-SEC	0.0156 V-SEC	
	+2057V, LOAD	4 IMP 12:34:57.00	

This printout indicates that an impulse originating from the load, of +2057 volts peak and an area of 0.0156V-Sec, occurred at the time shown. If the direction had been from the source, SRCE would be printed in place of LOAD in the example.

Figure B-1 illustrates an impulse strength (area) measurement.

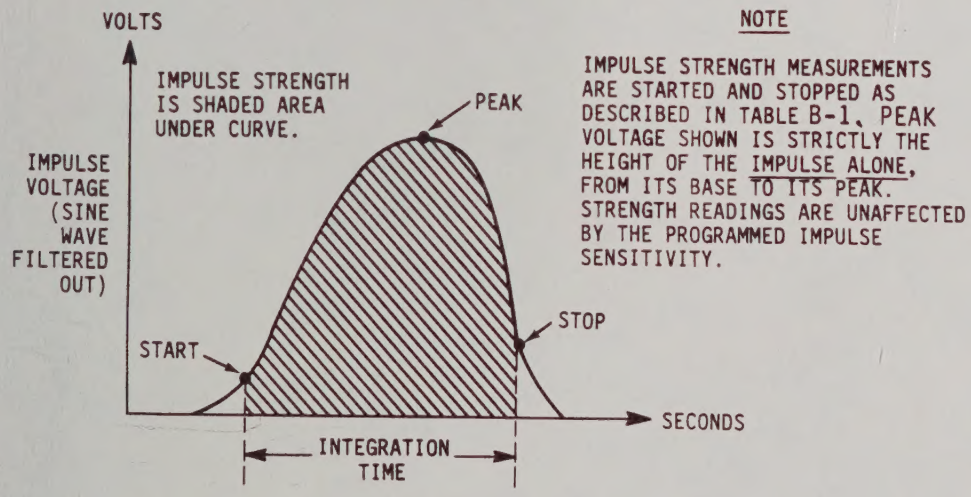
VOLTS
IMPULSE STRENGTH IS SHADED AREA UNDER CURVE.
PEAK
IMPULSE VOLTAGE (SINE WAVE FILTERED OUT)
START
STOP
SECONDS
INTEGRATION TIME
NOTE
IMPULSE STRENGTH MEASUREMENTS ARE STARTED AND STOPPED AS DESCRIBED IN TABLE B-1. PEAK VOLTAGE SHOWN IS STRICTLY THE HEIGHT OF THE IMPULSE ALONE, FROM ITS BASE TO ITS PEAK. STRENGTH READINGS ARE UNAFFECTED BY THE PROGRAMMED IMPULSE SENSITIVITY.

Figure B-1. Impulse Stregth Measurement

B.8 PRINTOUT MODES

Printout modes and calibration signals remain the same as in the standard 6006 described in 2.6.

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